Appendix C

The Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
250 Washington Street, Boston, MA 02108-4619

MITT ROMNEY
GOVERNOR

KERRY HEALEY
LIEUTENANT GOVERNOR

RONALD PRESTON
SECRETARY

CHRISTINE C. FERGUSON
COMMISSIONER

September 19, 2003

The Honorable Barbara Dortch-Okara
Chief Justice for Administration and Management
Administrative Office of the Trial Court
2 Center Plaza, 5th floor
Boston, MA 02108

Dear Judge Dortch-Okara:

At the request of Christopher McQuade, Administrative Office of the Trial Court, the Bureau of Environmental Health Assessment (BEHA), Emergency Response/Indoor Air Quality (ER/IAQ), was invited to conduct an evaluation of the indoor air quality at the Barnstable First District Court, Main Street, Barnstable, Massachusetts on August 28 and August 29, 2003. Michael Feeney, Director of Emergency Response/Indoor Air Quality (ER/IAQ), BEHA, conducted this inspection. Concerns about mold as a result of high humidity in Massachusetts during the first two weeks of August 2003 prompted this assessment. BEHA staff had previously visited this building in 1998 and 2000 because of concern over the indoor air quality of the building's basement.

During the spring and summer of 2003, New England experienced a stretch of unique and excessively humid weather. As an example, the outdoor relative humidity during August 1 through August 13, 2003 ranged from 82 percent to 100 percent (The Weather Underground, 2003). According to the American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE), relative humidity exceeding 70 percent may result in wetting and subsequent mold growth on building materials (ASHRAE, 1989). Both controlled and uncontrolled introduction of wet, moist air into an air-conditioned building can result in the chronic moistening of building materials, which may in turn result in mold growth.

The building materials that were identified as water damaged and likely susceptible to mold colonization are carpeting, gypsum wallboard, paneling, pipe insulation and ceiling tiles (Table 1). Uncontrolled sources for moisture entry were noted on the building envelope. As identified in the previous assessment and subsequent correspondence, several areas of the building on the ground floor had penetrations that were designed as "fabric barometric dampers" (WMGA, 1969). These "dampers" allowed for uncontrolled penetration of moist air into the building interior. Points in the juvenile court and probation section of the building could provide a means for uncontrolled migration of unconditioned, moist outdoor air into the building interior. Outdoor light could be seen above the ceiling of the juvenile session courtroom in a section *without ductwork*. This indicates that breaches may exist in the window systems of the building. These breaches allow for moist air to enter into the ceiling tile system or ceiling plenum.

A controlled source for moisture entry was also noted. Operation of the ventilation system on the topmost floor of the court provides a controlled source of water entry. Fresh air on the topmost floor is provided by unit ventilators (univents)(see Picture 1), which draw outdoor air through a fresh air intake vents (see Picture 2). Metal ductwork connects each univent to the fresh air intake vent (see Picture 3). The ductwork, fresh air intake vent and univent coil pipes exist above the ceiling plenum of the ground floors. This connecting ductwork should be flush to the walls of the fresh air intake. If an opening exists, moist outdoor air can penetrate into the building. Such openings were observed in univents located in the ceiling plenum above the juvenile session courtroom. The openings in the univent in conjunction with the aforementioned breaches in the window system would result in increased relative humidity in the ceiling plenum. According to BC staff, relative humidity above the ceiling in the juvenile court and probation sections of the building exceeded 80 percent, which confirms outdoor air penetration into the ceiling plenum. Under these conditions, pipes containing water (e.g. heating system, chilled water, restroom and sink plumbing), frames of the suspended ceiling, pipe hangers and pipe insulation with an insufficient R rating can all be surfaces that may be prone to generating condensation.

Condensation is the collection of moisture on a surface that has a temperature that is either at or below the dew point. The dew point is the temperature to which air must be cooled in order to reach saturation. For example, at a temperature of 76^{o} F and a relative humidity of 30%, the dew point required for water to collect on a surface is approximately 43^{o} F. Using actual weather data from August 4, 2003, the temperature at noon was 81^{o} F and with a relative humidity of 82%. These conditions would indicate a dew point of 75^{o} F. Using the example above, if the temperature within the building was set to be cooled at 70^{o} F during the summer, the building components would be chilled below the dew point. If in contact with outdoor air, the building components inside the building that were below the dew point would then generate condensation. The delamination of paneling along the exterior wall and around the return vent of the first session court room (see Picture 4) confirms excess condensation.

As stated, condensation occurs on pipes and other materials when spaces exist in the insulation or when the R rating of the insulation is not sufficient. Spaces between insulation sections can allow for moist air to come in contact with the metal of the chilled water pipes, creating condensation. The R rating is a mathematical representation of the ability of insulation to prevent temperature transfer. If an air conditioning system has chilled water pipes with an insufficient R rating, temperature could be transferred to the surface paper, thus creating condensation. Once insulation becomes moist, a temperature bridge is created, further wetting insulation and enhancing mold growth.

If mold contaminated insulation is allowed to remain in place, the material will continue to serve as a source of respiratory irritants. Removal of contaminated materials will remove the point source of these irritants. However, the removal of mold-contaminated materials poses several potential problems within an occupied building. Removal of the materials without proper containment of the work area and isolation of the HVAC system from contamination can further degrade indoor environmental conditions. Contaminants can be spread to occupied areas. Great care should be taken to prevent contamination from spreading into adjacent areas during remediation. Moreover, the underlying cause for the generation of condensation needs to be corrected to prevent a reoccurrence.

The conditions noted in this letter concerning mold growth require several steps in order to remediate this problem. Therefore, in view of the findings at the time of this assessment, the following recommendations are made:

1. Deactivate the air-conditioning system until control of condensation from the HVAC system is achieved. Consult with a ventilation engineer, as well as a building engineer, concerning appropriate measures to control condensation generated within this building.

2. Use local exhaust ventilation and isolation techniques to control remediation pollutants. Precautions should be taken to avoid the re-entrainment of these materials into the building's HVAC system. The design of each system must be assessed to determine the impact renovation activities may have on the HVAC system. Specific HVAC protection requirements pertain to the return, central filtration and supply components of the ventilation system. Meeting these requirements may entail:
    a. shutting down systems during periods of heavy construction and demolition, when possible;
    b. ensuring systems are isolated from contaminated environments;
    c. sealing ventilation openings with plastic; and
    d. utilizing filters with a higher dust spot efficiency where needed (SMACNA, 1995).

3. To contain the area, seal hallway doors with polyethylene plastic and duct tape. Consider creating an air lock by installing a second door inside the remediation spaces to reduce pollutant migration.

4. Relocate susceptible persons and those with pre-existing medical conditions (e.g., hypersensitivity, asthma) away from the general areas of remediation until completion, if possible.

5. Establish communications between all parties involved with remediation efforts, including building occupants, to prevent potential IAQ problems. Develop a forum, as well as a program, for occupants to express concerns about remediation efforts and to resolve IAQ issues.

6. Develop a notification system for building occupants immediately adjacent to (and above) the basement record storage area to report remediation/construction/renovation related odors and/or dusts problems to the building administrator. Have these concerns relayed to the contractor in a manner that allows for a timely remediation of the problem.

7. Schedule projects which produce large amounts of dusts, odors and emissions during unoccupied periods or periods of low occupancy, when possible.

8. Disseminate scheduling itinerary to all affected parties. This can be accomplished through meetings, newsletters or weekly bulletins.

9. Obtain Material Safety Data Sheets (MSDS) for all remediation/decontamination materials used during renovations. Store MSDSs in an area that is accessible to all individuals during periods of building operations as required by the Massachusetts Right-To-Know Act (MGL, 1983).

10. Consult MSDSs for any material applied to the effected area during renovation(s) including any sealant, carpet adhesive, tile mastic, flooring and/or roofing materials. Provide proper ventilation and allow sufficient curing time as per the manufacturer's instructions concerning these materials.

11. Implement prudent housekeeping and work site practices to minimize exposure to spores. This may include constructing barriers, sealing off areas, and temporarily relocating furniture and supplies. To control for dusts, a high efficiency particulate air filter (HEPA) equipped vacuum cleaner is recommended. Non-porous materials (e.g., linoleum, cement, etc.) should be disinfected with an appropriate antimicrobial agent. Non-porous surfaces should also be cleaned with soap and water after disinfection.

12. Consult *Mold Remediation in Schools and Commercial Buildings* published by the US Environmental Protection Agency (US EPA) (US EPA, 2001), for further advice on mold remediation. Copies of this document can be downloaded from the US EPA website at: http://www.epa.gov/iaq/molds/mold_remediation.html.

We suggest that the majority of these steps be taken on any remediation/renovation project within a public building.

A full report denoting air testing conducted throughout the building will be provided at a later date. We felt it important to provide you with an assessment of mold conditions and remedial suggestions as soon as possible in order for remedies to be promptly put in place. Please feel free to contact us at (617) 624-5757 if you are in need of further information or technical assistance.

Sincerely,

Suzanne K. Condon, Assistant Commissioner
Bureau of Environmental Health Assessment

cc/ Mike Feeney, Director, Emergency Response/Indoor Air Quality, BEHA
Christopher McQuade, Administrative Office of the Trial Court

Marilyn Wellington, Chief of Staff, Administrative Office of the Trial Court
Stephen J. Carroll, Director of Court Facilities
Joanna Rugnetta, Health and Safety Liaison, Administrative Office of the Trial Court
Hon. Samuel E. Zoll, Chief Justice, District Court Department
Hon. Joseph J. Reardon, First Justice, Barnstable First District Court
Elizabeth Minnis, Deputy Director, Office of Planning, Design, and Construction, DCAM
John Blaisdell, Facilities Director, Barnstable First District Court
Susan Kenyon, Chief Probation Officer, Barnstable First District Court
Marina Brock, Barnstable County Health Department
Senator Robert O'Leary
Senator Therese Murray
Representative Demetrius J. Atsalis
Representative Matthew Patrick
Representative Jeffrey D. Perry

References

ASHRAE. 1989. Ventilation for Acceptable Indoor Air Quality. American Society of Heating, Refrigeration and Air Conditioning Engineers. ANSI/ASHRAE 62-1989

MGL. 1983. Hazardous Substances Disclosure by Employers. Massachusetts General Laws. M.G.L. c. 111F.

SMACNA. 1995. IAQ Guidelines for Occupied Buildings Under Construction. 1st ed. Sheet Metal and Air Conditioning Contractors' National Association, Inc., Chantilly, VA.
US EPA. 2001. Mold Remediation in Schools and Commercial Buildings. US Environmental Protection Agency, Office of Air and Radiation, Indoor Environments Division, Washington, DC. EPA 402-K-01-001. March 2001. http://www.epa.gov/iaq/molds/mold_remediation.html.

Weather Underground, The. 2003. Weather History for Bedford, Massachusetts, August 1, 2003 through August 21, 2003. http://www.wunderground.com/history/airport/KHYA

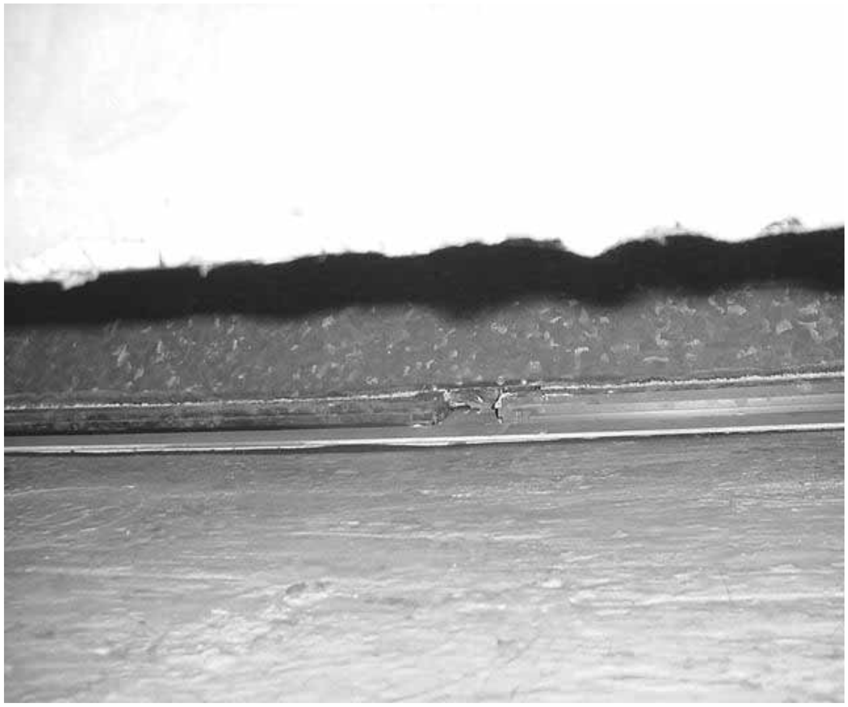
Picture 1

Univents

Picture 2

Fresh Air Intake Vents

Picture 3



Metal Ductwork Connect Each Univent to the Fresh Air Intake Vent

Picture 4

Delaminated Panel above Univent in 1st Session Courtroom